

**NOTES ON SOME BORNEO HAWK MOTHS (LEPIDOPTERA:
SPHINGIDAE) INCLUDING *EUPANACRA HOLLOWAYI* SP. N.
AND *MACROGLOSSUM AMOENUM* ROTHSCHILD & JORDAN,
NEW TO BORNEO**

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Introduction

SURPRISINGLY little systematic moth collecting has been carried out in Borneo in recent years and the fauna is still imperfectly known. Holloway surveyed the moth fauna of Gunung Kinabalu during a ten month visit in 1965 and was also part of the Mulu expedition to Sarawak in the late 1970s. Harman surveyed the sphingid fauna of Brunei during October 1978 and incorporated a number of other Brunei records in his paper (Harman 1981). Holloway collated known information from the island and listed a total of 94 sphingid species in his series on the Moths of Borneo (Holloway 1978).

This paper is the result of visits to Brunei and Sarawak, from 10th to 26th June 1990 and 20th December 1990 until 29th January 1991. A mercury vapour lamp was run on a total of 28 nights in Brunei and on 16 nights in Sarawak. Aside from some generator problems on the first three nights in June, the lamp was run from before dusk to after dawn on each night. No attempt was made to survey other moth groups or butterflies. Collecting sites were generally of two types. Firstly, in deep primary or secondary jungle where the author was taken by helicopter and secondly in suitable places accessible by road where the sheet could be hung on the side of the hired Toyota Landcruiser. The author drove from Brunei to Kuching on two occasions, in June 1990 and in January 1991. A map, on which all collecting sites are marked, is included.

A total of 71 species were recorded, including several new regional records and two species new to Bornei, one of which is described for the first time in this paper. This brings the known total of Borneo sphingids to 96.

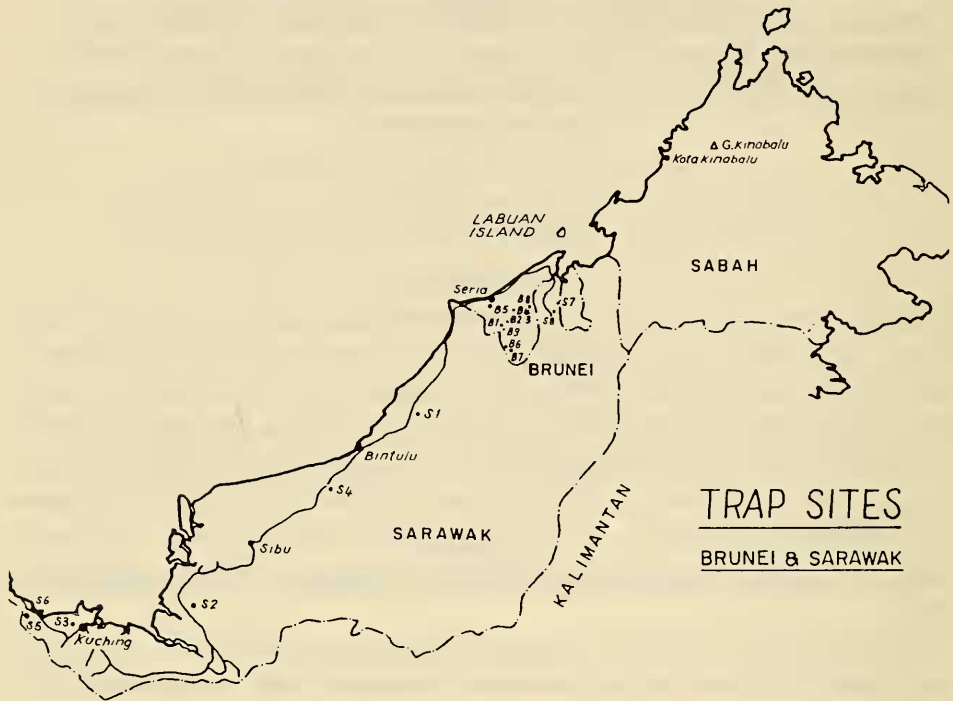
Undoubtedly there are more awaiting discovery.

Trap Sites

BRUNEI

B1. 2 nights (11/12.vi.90). 50m. Labi Road. Ca. 55km from junction with main Kuala Belait — Bandar Seri Begawan road. Cultivated area and swamp to the east and thickly wooded ridge to the west rising to 325m (Bukit Toraja).

B2. 2 nights (13.vi.90, 13.i.91). 110m. Labi Road. Unmarked logging track which begins to north of Labi Road ca. 45m from the junction and rises to an area with patchy (heavily logged) secondary forest.



B3. 3 nights (14/21.vi.90, 12.i.91). 200m. Labi Road. Higher up the same track as B2. Open area with a view over many miles of forest into Sarawak.

B4. 2 nights (15.vi.90, 29.xii.90). 50m. Labi Road; ca. 35km from the junction on patch of bare ground overlooking secondary growth.

B5. 1 night (31.xii.90). Just above SL. Ulu Belait. Secondary forest.

B6. 3 nights (22/23/24.vi.90). 110m. Sungai Keduan. Dense lowland primary forest on the banks of the Sungai Keduan, accessible only by helicopter. LP 414 (Grid 971637). This locality was notable for the presence of a Civet Cat which had no fear of humans and made off with a box of Oxo cubes and a tube of tomato puree!

B7. 9 nights (25/26.vi.90, 21/22/23/24/25/26/27.xii.90). 125m. Bukit Bahak. Thick primary forest, accessible only by helicopter. LP 338E (Grid 365782).

B8. 4 nights (14/15/24/25.i.91). 320m. Bukit Ladan. A sharp ridge on the Brunei/Sarawak border only recently made accessible by helicopter. Stupendous views to east and west. LP 365 (Grid 333108). The most prolific of all the sites — for butterflies as well as moths; an *Idea* was in the clearing when we flew in, and almost within seconds of the helicopter leaving the clearing was full of nominate *Trogonoptera brookiana* Wallace and *Troides amphrysus flavicollis* Druce feeding at ?*Senecio* species (Compositae).

B9. 2 nights (22/23.i.91). 325m. Bukit Toraja. Overlooking steep ridges covered in primary forest. LP 109 (Grid 900728).

SARAWAK

S1. 1 night (16.vi.90). 20m. Bintulu. About 100km north of Bintulu; 12km along unmarked logging track made 2 - 3 weeks earlier terminating in large muddy clearing in mainly secondary growth.

S2. 1 night (17.vi.90). 200m. Penom. 13m from the junction with the main Sibuh-Kuching Road, atop a small hill overlooking an area of mixed secondary forest and cultivation (mainly pepper).

S3. 8 nights (18/19.vi.90, 3/4/5/8/9/10.i.91). 720m. Gunung Serapi, 16km west of Kuching. The summit, slightly higher than the collecting site, houses a radio mast guarded by the Malaysian Army. The whole of the higher part of the mountain is said to be "restricted". The site chosen was a helicopter landing site on a ridge at the beginning of lower montane forest with a superb view over forested ridges to the Sarawak coast and Kalimantan. The site is apparently a National Park, although there was no indication of this on the first visit; on the second a sign had been erected telling visitors of its status.

S4. 1 night (20.vi.90). 410m. Tatau. Close to the summit of a solitary forested hill, 6km along a private unmarked track, 43km south of Bintulu.

S5. 1 night (6.i.91). 240m. Gunung Berumput. 3km before Biawak, unmarked logging track onto lower slopes of Gunung Berumput on the Sarawak/Kalimantan border, below area of undisturbed forest with good views towards Gunung Perigi.

S6. 1 night (7.i.91). 60m. Gunung Perigi. Outside town of Lundu on unmarked logging track, 300m from the main road, on the lower slopes of Gunung Perigi. Mixed pepper and disturbed forest growth.

S7. 2 nights (18/19.i.91). 100m. Limbang. 14km south of Limbang and a further 12km along a wide unmarked logging track. Small cultivated area below site and thickly forested steep ridge across the valley.

S8. 1 night (20.i.91). 320m. Bukit sagan, Limbang. Below radar station on narrow paved road overlooking primary forest.

The species

Agrius convolvuli L. B8 (26), B9 (2), S3 (27), S7 (3) (58). This widespread Old World species was not particularly common during the survey.

Megacorma obliqua Walker. B2 (4), B3 (7), B6 (7), B7 (44), B8 (30), B9 (5), S3 (30), S4 (2), S6 (1), S7 (7) (137). Common in most localities.

Acherontia lachesis F. B1 (1), B2 (3), B3 (7), B8 (86), B9 (4), S3 (73), S4 (1), S5 (2), S6 (2), S7 (32) (211). Common, particularly at isolated hill top sites.

Acherontia styx medusa Butler. B8 (7), S3 (2), S7 (3), (12). This is considerably more scarce than its congener. It was not taken in Brunei by Harman (1981). Holloway (1987: 122) was aware of only three recent specimens, all taken in Sabah. A total of 121 specimens were taken during this project in Brunei and Sarawak, always in the company of much larger

numbers of *lachesis*. It is interesting that of only four *Acherontia* specimens in the Kuching Museum, one is *lachesis* and the others are *styx*: two are labelled "Kuching. 29.x.1879" and "Kinabalu. 38 - 3100 feet. 20.ix.1913" respectively. The last has no data label. There are also two specimens in the Brunei Museum, caught in the Museum grounds on 5.x.77 and 9.xii.85.

Meganoton nyctiphanes Walker. B2 (1), B3 (2), B6 (1), B7 (5), B8 (7), S3 (4), S7 (2) (22). Widespread but never taken in large numbers.

Meganoton rufescens thielei Huwe. B4 (1), B8 (5), B9 (1) (7). An uncommon lowland species.

Psilogramma menephron Cramer. B2 (2), B3 (1), B7 (3), B8 (36), B9 (7), S3 (36), S5 (2), S6 (1), S7 (10) (98). This is a very variable species. A small proportion of individuals seen had a large area of dark scales around the forewing cell and between the cell and the costa; this is referable to form *casuarinae* Walker.

Psilogramma increta Walker. B2 (12), B3 (17), B4 (7), B6 (1), B7 (11), B8 (23), B9 (22), S3 (20), S6 (1), S7 (12) (126). Common.

Amplypterus panopus Cramer. B2 (3), B3 (5), B4 (2), B6 (1), B7 (4), B8 (34), B9 (5), S3 (8), S7 (1) (63). This large and attractive sphingid was rarely seen in anything other than single figures, although 19 came to light at Bukit Ladan on 14.i.91.

Ambulyx joiceyi Clark. S3 (3) (3). Three specimens came to light on 19.vi.90 and the species was not seen again, despite the light being run on a further seven nights in the same location. A specimen has been deposited at the BM (NH).

Ambulyx obliterated Rothschild. B2 (3), B3 (5), B7 (1), B8 (2), S3 (2) (13). This is a rare species not well represented in the National Collection. Five specimens have been deposited there.

Ambulyx substrigilis brooksi Clark. B4 (2), B7 (2), B8 (3), S3 (9), S7 (3) (19). Not a common species. Considerably smaller than *clavata* or *pryeri*. Three specimens have been deposited at the BM(NH).

Ambulyx tattina Jordan. B8 (4), S3 (2), S7 (1) (7). Holloway (1987: 131) notes three specimens of this species from Borneo. Those taken during this project display considerable variation. One specimen has been deposited at the BM(NH).

Ambulyx pryeri Distant. B1 (11), B2 (9), B3 (6), B4 (3), B6 (4), B7 (42), B8 (75), B9 (18), S1 (4), S3 (34), S6 (5), S7 (9), S8 (7) (227). This common moth was seen in most localities. Six males and four females have been deposited at the BM(NH).

Ambulyx clavata Jordan. B1 (1), B2 (1), B4 (2), B8 (1), S1 (1), S2 (1), S3 (2) (9). Considerably less common than *pryeri*, *clavata* cannot be separated from that species with any certainty other than by genitalic examination. Three males have been dissected to confirm identification and these, together with a female, have been deposited in the BM(NH).

Ambulyx canascens Walker. B1 (4), B2 (4), B3 (7), B4 (2), B6 (4), B7

(41), B8 (23), B9 (14), S2 (2), S3 (24), S7 (10) (135). Common.

Ambulyx subocellata Walker. B1 (6), B2 (9), B3 (8), B4 (2), B6 (14), B7 (41), B8 (92), B9 (53), S1 (2), S2 (1), S3 (34), S5 (6), S6 (3), S7 (20) (291). Common and extremely variable.

Clanis stenosema Rothschild & Jordan. B7 (3), B8 (2), S7 (2) (7). This is generally a latecomer to the light, specimens were seen flying at 0220 hours; 0300 hours, 0420 hours and 0510 hours. The others were not actually seen flying into the light but were all after midnight.

Harman (1981: 94) records five specimens of *C. bilineata* taken in lowland forest in Brunei; these may have been misidentified. There are three specimens of *stenosema* in the Brunei Museum all incorrectly labelled as *bilineata* (Sg. Burung, Ladan Area, Mohd. Jaya, 9.vi.79; ditto, 11.vi.79; Rampoyoh, 3.viii.89, M.J. Allen). The specimen of "*bilineata*" illustrated by Harman (1981: 98) is also *stenosema*. No specimens of *bilineata* were seen during this project.

Marumba juvencus Rothschild & Jordan. B2 (1), B3 (2), B4 (1), B7 (10), B8 (45), B9 (2), S3 (20), S7 (2) (83). Only four specimens were seen in June 1990; it was common in the same localities in December 1990 and January 1991. Four males and one female have been deposited in the BM(NH).

Marumba tigrina Gehlen. B8 (1) (1). A single example which came to light at Bukit Ladan on 24.i.91 is the first record for Brunei and apparently the third for Borneo.

Daphnusa ocellaris Walker. B1 (2), B2 (6), B3 (7), B6 (2), B7 (26), B8 (31), B9 (4), S2 (1), S3 (11), S6 (4), S7 (5) (99). This species appears to have two distinct colour forms; one is dark grey overall like that illustrated by D'Abbrera (1986: 85) and the other a reddish brown like that illustrated by Holloway (1987: plate 14, Fig. 6). Females rarely came to light and only six were seen, four of the "grey" form and two of the "red" form. A pair of each form have been deposited at the BM(NH).

Cyba decolor Walker. B2 (1), B4 (1), B8 (8), B9 (3), S2 (2), S3 (6), S7 (1) (22). A variable species which was usually among the first moths to the light. However, at 0130 hours on 10.i.91 at Gunung Serapi, a male flew into a pot of water some distance from the light; unfortunately for it, the water was just on the boil! Four males and two females have been deposited at the BM(NH).

Smerinthulus terranea Butler. B8 (1) (1). Harman (1981: 94), records an example taken by Allen at Seria on 20.v.78 and Holloway (1987: 140) records another specimen from lower montane forest during the Mulu survey. The only specimen seen during the present survey was at Bukit Ladan on 25.i.91.

Smerinthulus quadripunctatus Huwe. S3 (1) (1). A large, fresh female *quadripunctatus* came to the sheet at 1905 hours on 19.vi.90 at Gunung Serapi.

Degmaptera olivacea Rothschild. B7 (3), B8 (1), S8 (1) (5). Five, mainly fresh, males were taken at Bukit Bahak, Brunei on 22.xii.90, 25.xii.90 (2);

Bukit Sagan, Limbang, Sarawak on 20.i.91 and Bukit Ladan, Brunei on 25.i.91. Two of the specimens have a reddish ground colour like those illustrated by D'Abbrera (1986:87), and Holloway (1987: plate 15, Fig. 6); the remainder are a dark green. One of each colour form has been deposited at the BM(NH).

Only four specimens seem to have been known previously — one from Sarawak, two from Sabah and one from Peninsula Malaysia (Holloway 1987: 142).

Callambulyx rubricosa amanda Rothschild & Jordan. B2 (1), B3 (1), B6 (1), B7 (3), B8 (2), B9 (1), S3 (4), S7 (1) (14). Only seen singly, except for 8.i.91 when two came to the sheet at Gunung Serapi. D'Abbrera (1986: 188), supports the African *Euchloron megaera* L. as the most beautiful of all the hawk moths. A fresh *rubricosa* must also be a contender for that title! A specimen has been deposited in the BM(NH).

Gnathothlibus erotus erotus Cramer. B8 (4), S3 (9) (13). Holloway (1987: 145) notes only four specimens taken in recent surveys. A specimen has been deposited in the BM(NH).

Daphnis hypothous Cramer. B1 (22), B2 (11), B3 (96), B4 (23), B5 (3), B6 (32), B7 (37), B8 (664), B9 (108), S1 (6), S2 (2), (S3 (310), S4 (18), S6 (3), S7 (8), S8 (25) (1404). The most ubiquitous and numerous of Borneo sphingids usually at the sheet in large numbers even when it was wet, windy and relatively cold (51 were seen at Gunung Serapi on 5.1.91, a cold and miserable night). More than 100 individuals were seen on three different nights and on 25.1.91, at Bukit Ladan, an estimated 330 came to the light. Although an attempt to count individuals was made throughout, weight of numbers occasionally made it almost impossible. The total recorded is estimated and errs on the conservative side.

Daphnis placida Walker. B2 (1), B4 (1), B7 (1), B8 (1), B9 (1), S3 (4) (9). Harman (1981: 94) records eight specimens of *placida* and no *hypothous*; Holloway (1987: 147) notes only two recent *placida* from Borneo, one from Kinabalu in Sabah and the other from Mulu in Sarawak and states that the Harman *placida* are in fact *hypothous*. There is a specimen of *placida* in the Brunei Museum bearing data from the expedition which formed the basis of Harman's paper (Temburong. Mixed Dipterocarp. 300m. ix/x.78) and it is almost certain that both species were recorded at that time. There are a further two specimens caught in the Museum grounds on 3.xii.77 and 28.vii.78. All *placida* in the Museum collection were labelled *hypothous*.

Elibia dolichus Westwood. B1 (1), B2 (3), B3 (1), B6 (1), B7 (4), S1 (1), S3 (2), S6 (1), S7 (3) (17). Widespread but uncommon.

Acosmeryx anceus subdentata Rothschild & Jordan. B1 (2), B2 (28), B3 (14), B4 (8), B5 (2), B6 ((5), B7 (1), B8 (17), B9 (4), S1 (6), S3 (14), S5 (14), S6 ((4), S7 (52) (171). Widespread but not as common as the next species. It was the only sphingid to appear regularly at the hut lights at the Gunung Mulu Base Camp in November 1989 (not part of this survey).

Acosmeryx shervillii Boisduval. B1 (16), B2 (28), B3 (36), B4 (3), B6

(19), B7 (32), B8 78), B9 (5), S1 (48), S3 (34), S5 (3), S6 (1), S7 (83) (386). The relative abundance of forms *pseudonaga* Butler and *shervillii* Boisduval was not formally noted, although the former was certainly much commoner.

Gehlenia falcata Hayes. S3 (13) (13). This species was only seen at Gunung Serapi on 18/19.vi.90. Four specimens have been deposited at the BM(NH).

Eupanacra busiris Walker. B3 (1), B7 (1) (2). Two specimens of this rare species were taken, one at 200m above Labi Road and the other at Bukit Bahak on 24.xii.90. Both are considerably larger than those in the author's series from Hong Kong. The apparent scarcity of this, and other similar species may be due to their sporadic appearance at light; they were often netted at dawn in Hong Kong feeding at *Duranta repens* (Verbenaceae), oblivious to the light only a few feet away (Tennent, in press).

Eupanacra variolosa Walker. B6 (2), B7 (12), B8 (1) (15). Harman (1981: 95) noted only one specimen of this species during his survey and Holloway (1987: 154) records it as being rare. Seven individuals, including the only female found, came to light on Christmas Eve at Bukit Bahak. It is not always easy to see what make conditions ideal but this was obviously such an occasion since a total of 11 *Eupanacra* of four species, appeared at the sheet before 1900 hours. Two *variolosa* have been deposited at the BM(NH).

Eupanacra dohertyi Rothschild. B1 (5), B2 (4), B3 (1), B4 (3), B7 (2), B8 (14), S1 (3), S3 (4), S6 (2), S7 (5) (43). The most frequently met with member of the genus in Borneo. Although every specimen was closely examined, no *psaltria*, which resembles *dohertyi* quite closely, were found. Three specimens have been deposited at the BM(NH).

Eupanacra automedon Walker. B3 (1) (1). A single specimen of this rare *Eupanacra* was taken above the Labi Road, Brunei, on 12.i.91. Holloway (1987:154), remarks that no specimens have been taken in recent surveys.

Eupanacra malayana Rothschild & Jordan. B2 (1), B7 (1), B8 (1), S7 (1), S8 (1) (5). An uncommon species met with only singly.

Eupanacra hollowayi sp. n. (Plate 1, Figures 1,2). *Panacra psaltria* Jordan; Diehl, 1980 *Heterocera Sumatrana* 1: 41; pl. VII; fig. 5 (Misidentification).

Description. *Male*. Thorax and abdomen with a broad pale green band, darker at the thorax.

Forewing. Prominent white subapical zig-zag mark with asymmetrical angles, as in *E. dohertyi*. Median dark oblique line becoming indistinct just short of the apex. Basal area costad of this line heavily mottled with dark moss-green.

Hindwing. Distinct pale orange submarginal lunules in spaces 2, 3 and 4. Underside with prominent pale green mark from near cell to outer margin.

Genitalia. Not dissected.

Female. Not known.

HOLOTYPE male BRUNEI: Bukit Bahak, LP 338E, 125m, 24.xii.1990 (W.J. Tennent) (British Museum (Natural History)).

Discussion. A single specimen of this attractive insect, quite unlike any other known member of the genus, came to light at 1845 hours on Christmas Eve 1990. It was the first sphingid to arrive on what was obviously a night of ideal conditions since it was followed in the next 15 minutes by a further ten *Eupanacra* of three species; more than were seen on any other night.

At least one further specimen is known, namely that misidentified as "*Panacra psaltria*" by Diehl (1980:41; pl. VII; fig. 5). It is clearly not that species (Holloway 1987: 153).

Diehl states (1980: 41) "Die zierlichste Panacraart, die man etwa als ein Zwischenglied zwischen *busiris* und der *automedon-malayana* Gruppe betrachten kann. Durch einen glücklichen Zufall fand ich die Raupe dieses seltenen Falters an einer Scindapusart (Aroideae) und konnte sie erfolgreich züchten. Die Puppe hat durch grüne Tönungen etwas Ähnlichkeit mit der von *busiris*." (The most attractive *Panacra* species which one can consider to be between *busiris* and the *automedon-malayana* group. Through a happy coincidence I found the larva of this rare moth on *Scindapus* species (Aroideae) and was able to rear it successfully. The pupa has an overall green tone and a similarity to *busiris*).

Distribution: Borneo; Sumatra.

Eupanacra psaltria, which resembles *dohertyi*, is still known only from Borneo. Indeed, following the discovery of *Macroglossum pseudungues* Holloway in peninsular Thailand (Kitching, *unpublished data*), *psaltria* is now the only sphingid endemic to the island.

Eupanacra mydon elegantulus Herrich-Schäffer. B7 (3), B8 (1), S3 (1) (5). All those seen came to the sheet very early in the evening, with the exception of one, which flew in at 0558 hours on Christmas Day 1990, just before dawn. A specimen has been deposited at the BM(NH).

Angonyx testacea Walker. S2 (1), S3 (22) (23). Most specimens came to light either at dusk or dawn, although it was also seen flying around the light at 0200 hours on 3.i.91 at Gunung Serapi. It was taken commonly at light in Hong Kong and was seen flying there at 2300 hours (Tennent, *in press*).

Empinanga vigena Butler. B4 (1), B6 ((2), B7 (4), B8 (2), S7 (1) (10). Very much more scarce than *borneensis*, seven were taken in June 1990, the other three were taken in Brunei and Sarawak in January 1991. The first to be seen was the only female. Holloway (1987: 157) notes only three specimens from Borneo.

Empinanga borneensis Butler. B1 (1), B2 (11), B3 (5), B4 (9), B6 (5), B7 (35), B8 (9), B9 (4), S1 (1), S3 (10), S5 (1), S6 (1), S7 (6) (98). Widespread and common although females were rarely seen at light. The only females seen were at Bukit Bahak on 22.xi.90 and Gunung Serapi on 10.i.91; another was taken at light by Thom near sea level at Ulu Belait on 15.vi.90.



Plate 1. Figure 1. *Eupanacra hollowayi* sp. n. male upperside.
Bukit Bahak (LP 338E) Brunei.
125 metres. 24.xii.1990. (Scale bars = 1mm.)

Figure 2. Underside.

Eurypteryx bhaga Moore. B8 (3), S3 (4) (7). All individuals seen arrived at the light early in the evening, before 2000 hours, apart from one which was found sitting on the sheet at dawn.

Eurypteryx falcata Gehlen. B6 (1), B7 (1), B9 (1) (3). Holloway (1987: 159) notes this species to be extremely rare in lowland areas with only three individuals known from Borneo. It seems to be rare throughout its range. Those taken during this project were by the Sungai Keduan on 22.vi.90; at Bukit Bahak on 21.xii.90 and at Bukit Toraja on 23.i.91. The Bukit Bahak specimen has been deposited at the BM(NH).

Macroglossum amoenum Rothschild & Jordan. S3 (4) (4). Four specimens of this species which came to light within ten minutes of turning the light on at Gunung Serapi on 19.vi.90, constitute a new record for Borneo. It was formerly known only from a few specimens from Singapore and Bangka Island. Identification has been confirmed by genitalic examination and two specimens have been deposited in the BM(NH).

Macroglossum passalus Drury. B8 (1), S3 (3) (4). All four specimens appear to have come to light at dawn since, although they were not seen arriving, all were in very good condition and followed periods of heavy rain when most other moths on the sheet were showing serious signs of wear.

Macroglossum faro Cramer. Seria (1) (1). A fresh specimen found dead on the military aircraft hangar floor at Seria, Brunei, on 9.i.91 seems to be only the second record for Borneo. The only other Bornean specimen was taken at Ulu Belait, not far from Seria, on 23.i.79 (Harman 1981: 95).

Macroglossum mediovitta Rothschild & Jordan. B6 (1) (1). A specimen came to light on the banks of the Sungai Keduan early on 24.vi.90. This is the second individual known from Borneo.

Macroglossum corythus luteata Butler. B8 (1), B9 (1), S3 (5) (7). This and the next species are easily confused and the only certain way of separating worn or greasy specimens is by genitalic examination. However, fresh specimens can be separated by the colour of the underside of the fan and the abdomen, which in *corythus* is chestnut brown and in *sylvia* very dark brown with light grey or white median abdominal patches (Kitching, pers. comm.). Holloway (1987: 164), records only three recent specimens of *corythus*, all taken in upper montane forest above 1500m in Brunei. Specimens taken during this project were at 320 and 325m in Brunei and at 720m in Sarawak. One specimen has been deposited at the BM(NH).

Macroglossum sylvia Boisduval. S3 (7) (7). This is considerably less common than *corythus* throughout its range. Holloway (1987: 165), states that no recent Bornean material can be reliably associated with *sylvai*. The seven specimens taken during this survey were all at 720m, often flying with the previous species. Two individuals have been deposited at the BM(NH).

Macroglossum semifasciata Hampson. S3 (3) (3). Holloway (1987: 165), was only aware of one specimen of this species from Borneo; the holotype from Labuan Island. During the late afternoon of 19.vi.90, at Gunung Serapi, the author was awakened in the back of his Landcruiser from a

deep sleep (brought on by too much wine with lunch at the Kuching Hilton earlier!), by a Malaysian Army Sergeant clutching between thumb and forefinger a live, but remarkably undamaged female *semifasciata*, which he had just caught by hand on the Army camp wall just above the trap site. Two further specimens came to light at the same locality on 9.i.91.

Macroglossum aquila Boisduval. B9 (1) (1). One specimen was seen at Bukit Toraja, Brunei, on 23.i.91. The generator was turned off at 0640 hours, about half an hour after dawn; some five minutes later a loud buzzing sound around the sheet proved to be an *aquila* flying very fast and probing small dead (drowned after very heavy rain some hours earlier) moths with its proboscis. Like all *Macroglossum* species it was very difficult to approach; it remained in the vicinity and was eventually netted drinking from a puddle.

Macroglossum variegatum Rothschild & Jordan. S3 (3). Three *Macroglossum* were taken at light at Gunung Serapi on 19.vi.90 (2) and 9.i.91; they are considered likely to belong to this variable species which can really only be positively determined by genitalic examination. The genitalia have not been examined.

Hippotion celerio L. S3 (5), S6 ((1), S7 (2) (8). This very widespread Old World species was only seen singly.

Hippotion echeclus Boisduval. B8 (4), B9 (1) (5). Both Harman (1981: 96) and Holloway (1987: 171), note this species from open lowland habitats. All five specimens seen during this survey were in well forested areas at 320m and 325m.

Hippotion boerhaviae F. B2 (1), B3 (2), S3 (3), S6 (2) (8). This and the next species are difficult to identify with certainly other than by examining the genitalia. Although all specimens taken have been allocated to one species or the other they are, in some cases at least, provisional.

Hippotion rosetta Swinhoe. B2 (4), B4 (4), B8 (1), S3 (19) (28). Commoner than the last species in Borneo (Holloway 1987: 172). There are several hundred of this species and/or *boerhaviae* in the Brunei Museum, all taken in the Museum grounds.

Theretra nessus Drury. B2 (4), B3 (9), B5 (1), B7 (2), B8 (24), B9 (9), S1 (1), S2 (1), S3 (264), S4 (1), S5 (1), S6 ((2), S7 (12) (331). Very common and often abundant.

Theretra boisduvalii Bugnion. B2 (1), B3 (1), B8 (4), S1 (1), S3 (16), S7 (3), S8 (1) (27). Listed as *boisduvali* by Harman (1981: 96), D'Abbrera (1986: 194) and Holloway (1987: 174). Found less commonly than *clotho*, but nevertheless widespread.

Theretra rhesus Boisduval. B8 (2), S3 (1), S5 (4), S6 (30), S7 (3) (40). Holloway (1987: 175) says "*T. rhesus* appears to be rare, the four specimens being taken at altitudes from 250m to 1200m." It was found only sporadically during this survey apart from on 7.i.91 when 30 came to light on the lower slopes of Gunung Perigi, Sarawak. Of these, 27 individuals came prior to 2100 hours, before any *clotho* were seen. *Clotho*

became very common later that night and only three further *rhesus* appeared. The four *rhesus* seen the previous night on the slopes of Gunung Berumput, also came to light early, before any *clotho*.

Theretra clotho Drury. B2 (5), B3 (18), B4 (8), B6 (2), B8 (52), B9 (7), S1 (1), S2 (1), S3 (22), S5 (23), S6 (48), S7 (136), S8 (6) (329). A very common and widespread species.

Theretra latreillii lucasii Walker. B1 (10), B2 (5), B3 (15), B4 (2), B6 (3), B8 (9), S1 (3), S2 (5), S3 (6), S5 (14), S6 (18), S7 (30) (120). Listed as *latreillei lucasi* by some authors. Common and widespread.

Theretra alecto L. B8 (1), S5 (4), S7 (11) (16). Not seen often during the project, probably because it tends to be taken in cultivated areas (Holloway 1987: 177); most of the trapping for this survey was in forest areas at a reasonable altitude. It was not noted by Harman (1981).

Theretra suffusa Walker. B5 (1), S5 (2), S6 (2), S7 (1) (6). Like the last, this is a lowland species found in open cultivated areas.

Theretra silhetensis Boisduval. B1 (5), B2 (7), B3 (6), B8 (7), B9 (2), S6 (2) (31). This species was not uncommon. Although all specimens were examined carefully, no *T. oldenlandiae* were found.

Pergesa acteus Cramer. B3 (1), B7 (1), B8 (4), B9 (2), S1 (3), S3 (1), S6 (12), S7 (17) (41). Not uncommon but sporadic in appearance.

Rhagastis rubetra Rothschild & Jordan. B7 (2), B8 (1), S5 (1), S7 (1) (5). The only specimens apparently noted in Borneo prior to this survey, were four individuals recorded by Harman (1981: 96) and mentioned by Holloway (1987: 182).

Cechenena lineosa Walker. B7 (1), B8 (1), S3 (3), S5 (1), S7 (1) (8). It is interesting that Harman (1981: 96) found this species to be the most abundant sphingid in Brunei. During this survey it was almost the most scarce. Perhaps it is seasonal, although the period covered by this paper includes June, December and January.

Cechenena helops Walker. B1 (1), B2 (11), B3 (12), B7 (20), B8 (26), B9 (11), S1 (2), S3 (31), S5 (3), S6 (6), S7 (20) (143). Widespread and common.

Cechenena aegrota Butler. B1 (1), B2 (2), B3 (1), B4 (1), B6 (1), B7 (26), B8 (2), S1 (3), S3 (9), S4 (1), S5 (1), S6 (3), S7 (1) (52). Harman (1981:96), found this species universally in Brunei and Holloway (1987: 183), noted two specimens during the Mulu survey (Sarawak). During this project it was found to be widespread but uncommon.

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A remarkable assemblage of beetles under one stone

Stone-turning is usually among the first collecting methods to be practised by the young beetle-hunter, calling as it does for no special knowledge or apparatus. So at least it was in my own case, when I pursued it to good effect in the gardens both of my parents and (for one season) of my prep-school in Blackheath from the late 1920s. Seldom, however, I venture to think, can such a rich haul of beetles have been obtained from under a single stone of modest size, as on the occasion related here: well over fifty specimens comprising at least sixteen species.

The site was a more or less sterile sand and gravel pit at Plumstead in the S.E. London suburbs, where I had previously found nothing of note. On the occasion in question (11.vii.1958), the pit was particularly dry and barren; two or three slightly damp patches remained on its floor but even they were devoid of beetles. As a last resort, and expecting to draw a blank, I rather casually turned over a solitary stone — the only one there. To my utmost astonishment, small beetles were scattering from under it in all directions, making it no easy matter to collect them or what I hoped was the majority of them. (The assemblage, whatever its composition, was obviously of considerable interest in itself.) Some individuals must have made good their escape but I am inclined to think few or no species were